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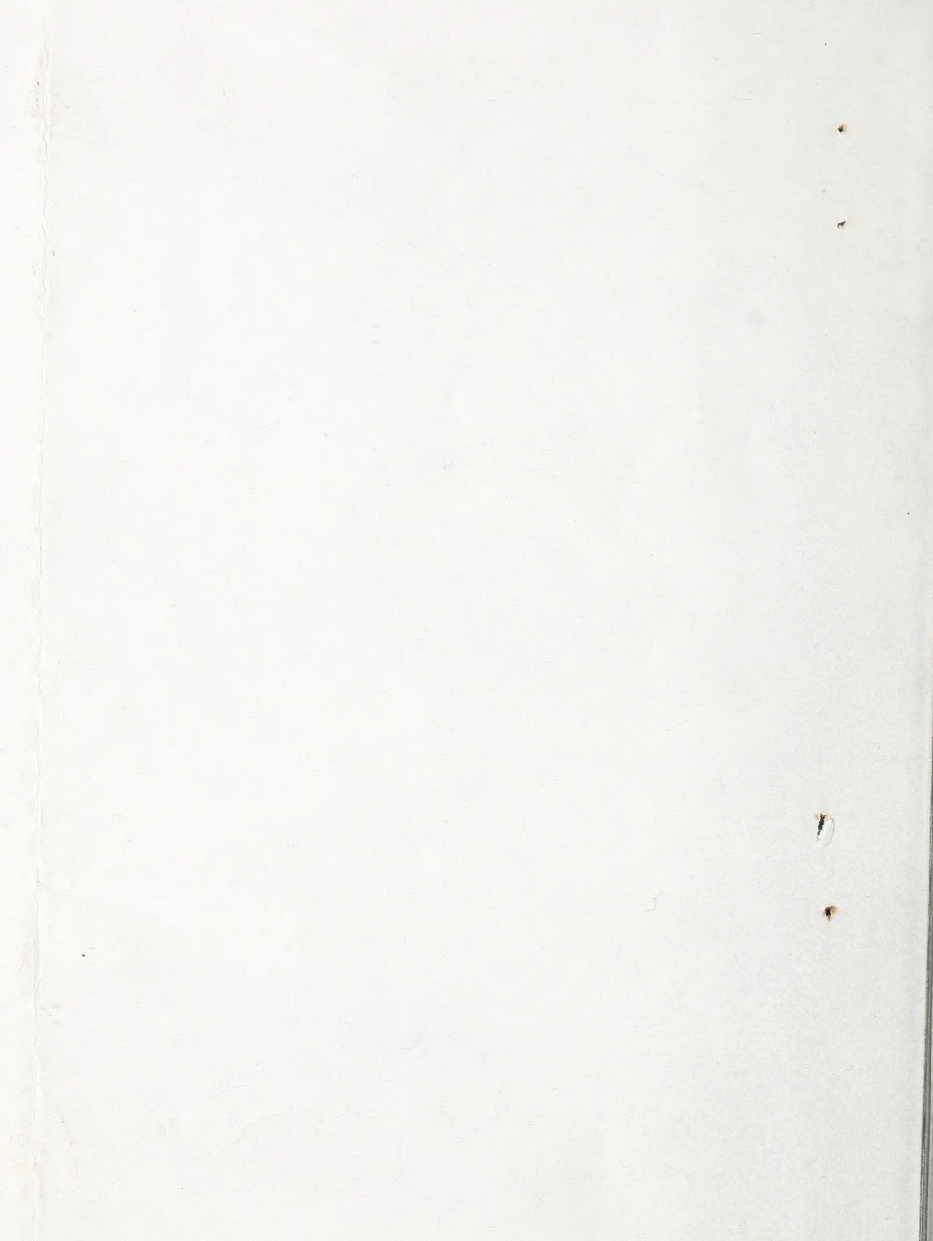
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UNITED STATES ATOMIC ENERGY COMMISSION
Technical Information Service Extension, Oak Ridge, Tennessee



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Field Trial of Treatments Affecting Strontium Uptake

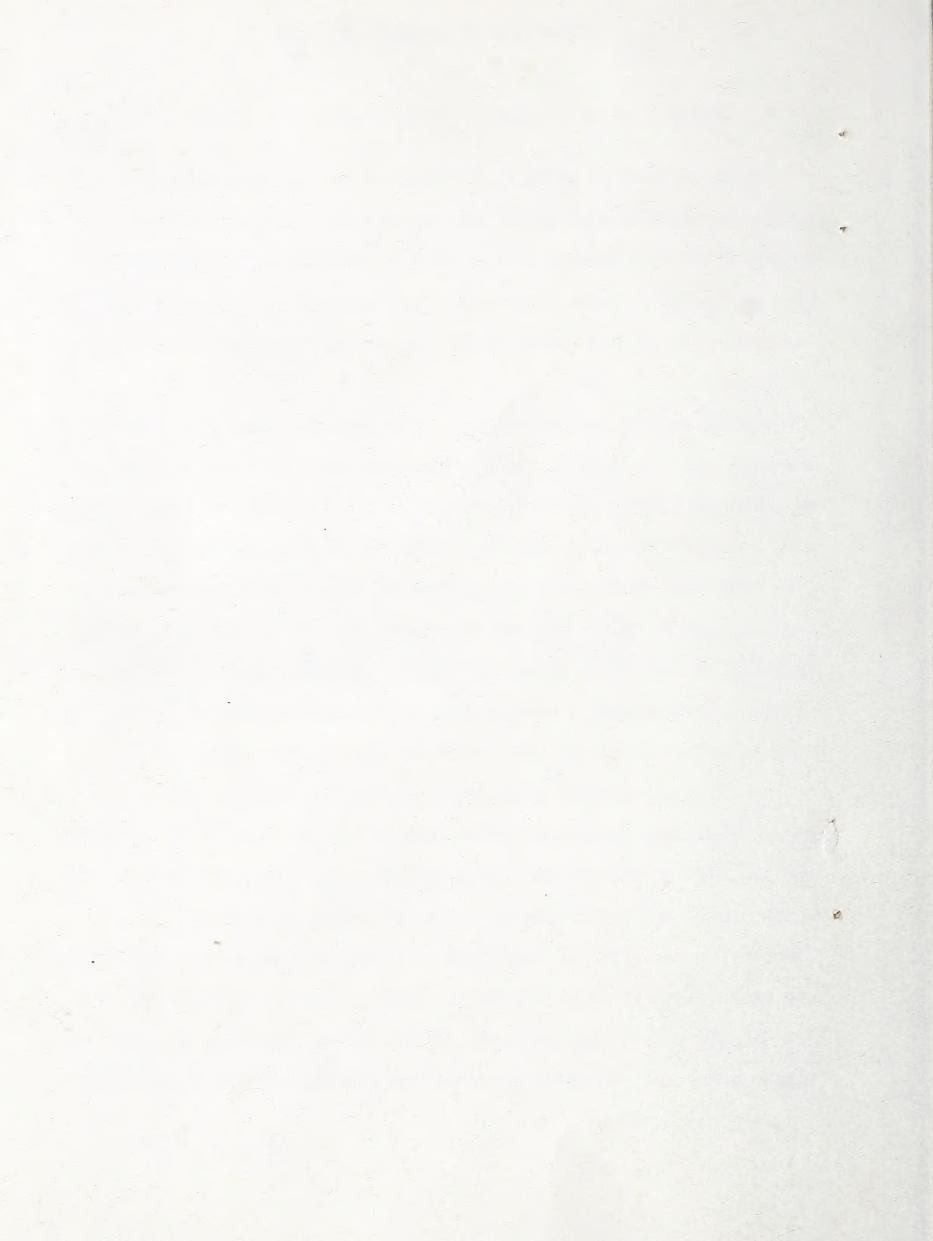
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Uptake of Sr89 by soybeans or bluegrass was measured following artificial contamination of the soil surface in a field experiment. Effects of various combinations of tillage treatments and additions of lime on this uptake were determined. The uptake of calcium by the crops was determined and the ratios of Sr89 to calcium calculated for the soil and crops.

The experiment was located on a level area of Elkton silt loam at the Plant Industry Station, Beltsville, Maryland. This soil had average pH values of 5.25 in the 0-12 inch layer and 4.9 in the 12-18 inch layer, with a standard deviation between 25 foot square plots of ± 0.15 . In the 0-12 inch layer of the same plots there was 2.7 ± 0.4 meq. exchangeable Ca per 100 grams of soil. The soil was plowed and worked down to a seedbed condition several weeks before the surface was contaminated. The entire area was enclosed with a fence and an 18 inch earthen dike to prevent runoff. A shallow ditch was left inside the dike in its construction.

The tillage and lime treatments were such as might be practical on agricultural land in eastern United States. For the crop of soybeans, the Sr89 was left on the surface, rototilled into a 6 inch layer of soil, plowed under to 6 inch depth, or buried 15 inches below the surface. Lime was applied with the rototilled treatment at rates of 0, 4, or 8 tons per acre. With the other tillage treatments, only the four ton per acre rate of lime application was used. In the buried treatment, the lime was either buried with the Sr89, or raked into the surface soil after burial.

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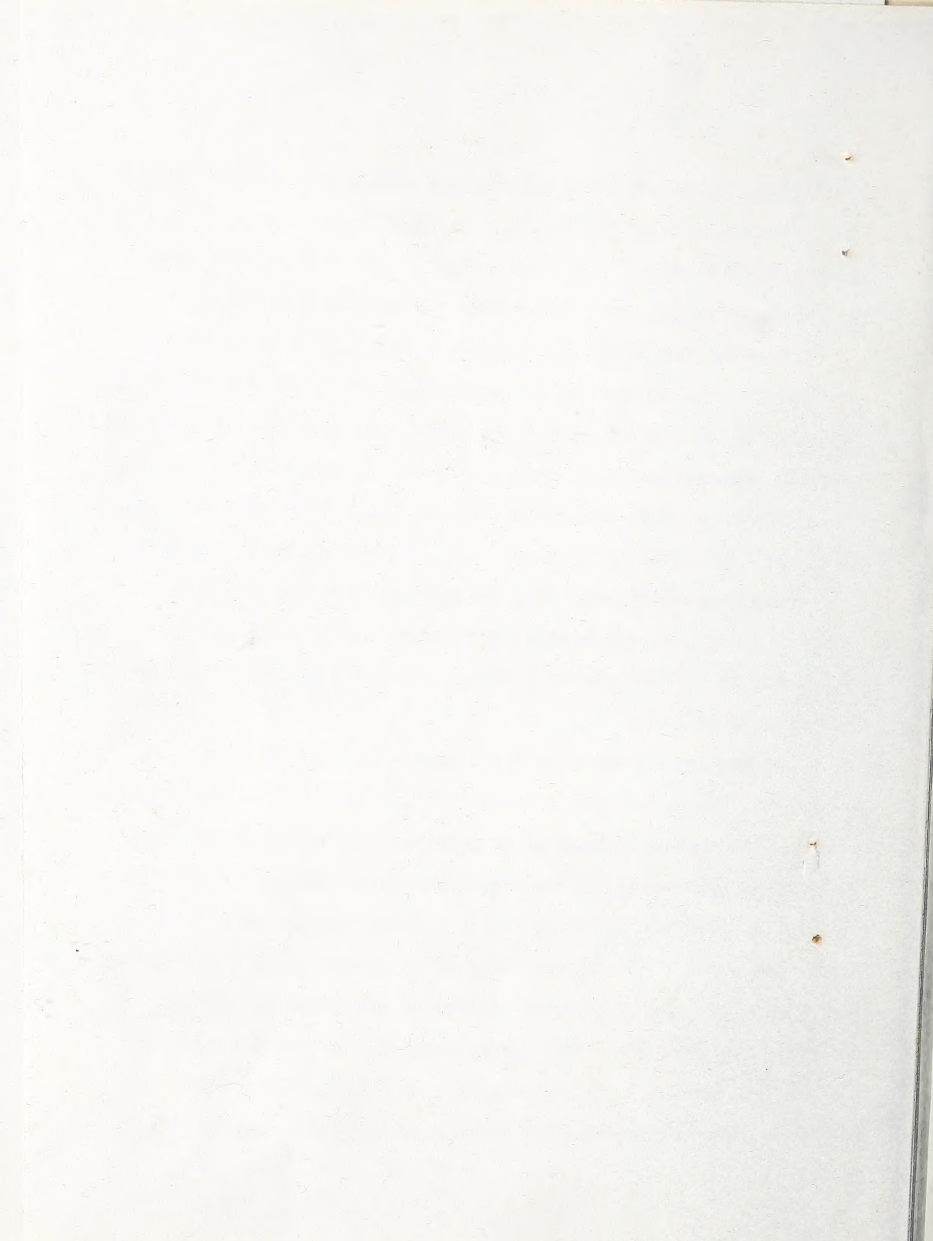


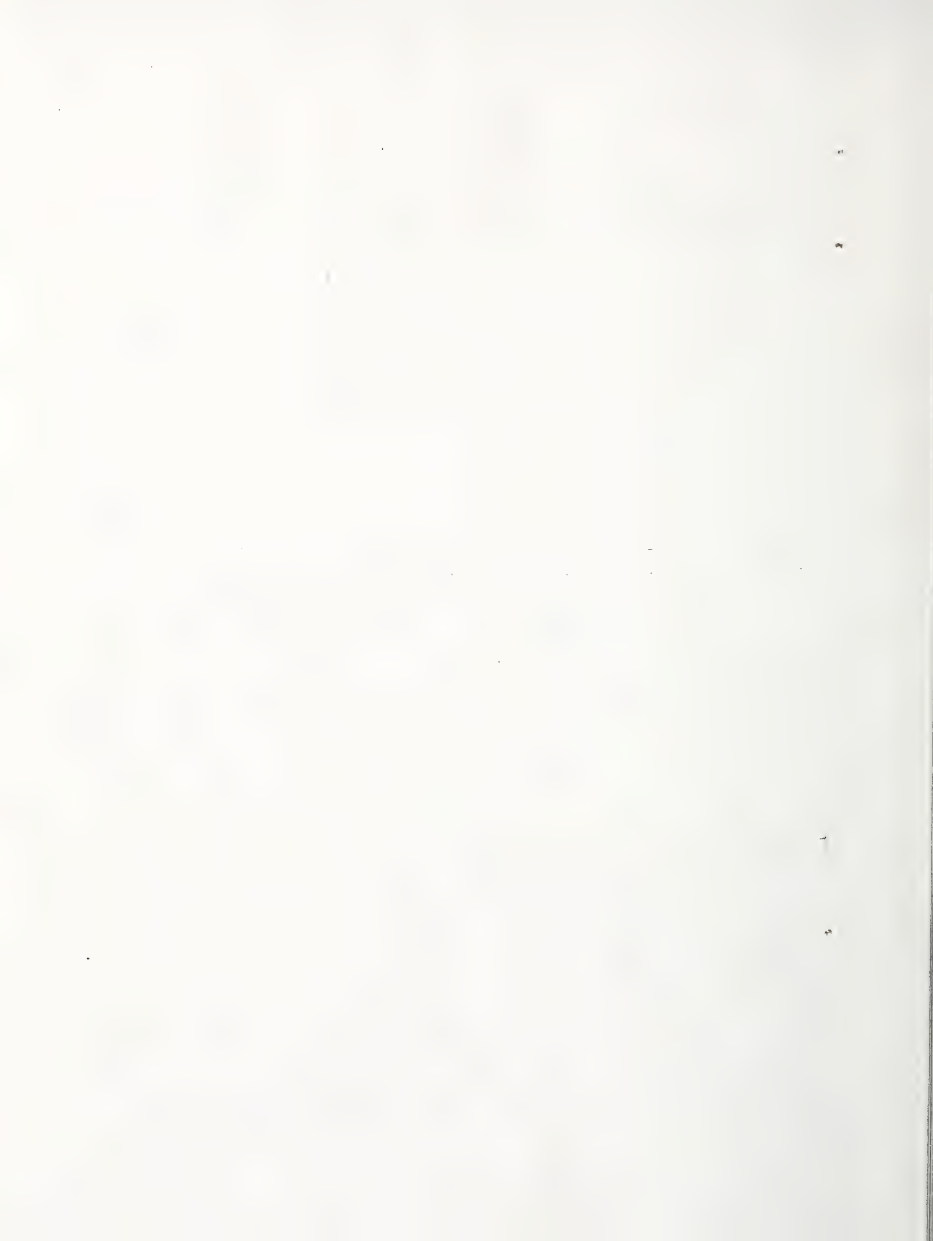
of the Sr89. As a check treatment Sr89 was left on the surface without lime as well as with the four ton per acre application. Only the surface and rototilled treatment with 0 and 4 tons of lime per acre were used for the bluegrass sod. Each treatment was replicated three times.

In order to facilitate the operation of the tillage implements, a split block design was used in the experiment, with all of the rototilled treatments in the same row of each replicate. The plot area for the tillage treatment with soybeans was 9 feet by 15 feet. In the center of this, an area 6 feet by 10 feet received the Sr89 and lime. Three rows of soybeans were planted 36 inches apart on each plot, and analyses were made on the harvest from the center row. With the bluegrass sod, the plot area was 4 feet by 6 feet, the entire area receiving the Sr89, lime, and tillage treatment. The harvest was taken from an area 2 1/2 feet by 4 1/2 feet in the center of the plot.

A uniform application of Sr89 was made by spraying on the surface of the soil, except the deep placements of Sr89 were made in pits 15 inches deep, and the surface application on grass was made on top of the grass. The Sr89 was obtained on May 18, 1954 from Oak Ridge National Laboratory as solution of irradiated $\text{Sr}(\text{NO}_3)_2$, with a specific activity of 3.97 millicrouries per gram Sr. The intended rate of application was 100 microcuries per square foot. The radioactive solution to be applied to each plot was diluted to one liter. This solution was applied with one pass at slow walking speed of a mounted spray boom five feet in length. The radiation level immediately after application was 5-8 mr./hr. at five

537-02





with addition of 50-100 cc. of solvent. This solvent dissolved essentially all of the 200 cc. of the 10% solution and was removed with a 2-3 inch centrifuge bucket. A 100 cc. amount of the solvent was filtered with filter and residual solids, and the 100 cc. amount was removed by filtration and dried with calcium chloride.

The results of the present study indicate that the use of the present study is not significantly different from the results of the present study, as only the results of the present study are shown.

The value of SO_4 and Ca in the crops (Table 2) shows a small reduction at the relative values of SO_4 with the different treatments, due to the experimental design. Comparisons are more exact within blocks than they are between blocks. With repeated the highest value of SO_4 was obtained when the surface application was combined with the sub-surface of SO_4 , although it was not significantly higher than the yields from some of the treatments in the other trials. The applications were effective, but heavy placement of SO_4 was quite ineffective in reducing yields of SO_4 by crops. With nitrogen the application of Ca was ineffective. The yields that are significantly less than with the sub-surface treatments, at a high, than from the surface treatments. For other nutrient treatments and nitrogen the differences are not significant. The slight yield of SO_4 and Ca in the crops is due to the fact that the crops are less than the soil and the atmosphere.



- 3 -

The weight of 2000 and 25 lb in the hole has been sufficient from the
 start of explorations at 2000 and 2500 and the original method of
 determining the weight, 2.7 lbs, at 10 per 100 grams of soil supports an
 equal 20 grams of 25 lb in a 10 inch piece of soil, or 20 grams in 10 inch
 depth. With 20 lb soil the value would be equal to 20 lb. 2000, or
 10 lb. 2000 of soil. And if the soil has 10 lb. 2000 of soil,
 the weight is 20 lb. 2000 or 20 lb. 2000. It was in experimental
 system of the hole walls by plates. In this experiment, it appeared that
 the 2000 was over the hole of the hole from 2000 to 2000 of soil,
 and the system then was that 2000 of soil in relation to a hole
 of 20 lb. 2000 was equal to 20 lb. 2000 per 100 grams of soil, but that 20 lb.
 was equal to 20 lb. 2000 in some suitable during these growing months.

The accuracy of the method of determining the weight of the hole
 system of 2000 is given in Table I. The hole is the system of
 the hole, and the hole is 20 lb. 2000 of soil per 100 grams. The
 system of 20 lb. 2000 is 20 lb. 2000 of the hole, and the hole
 is the system of 20 lb. 2000, respectively.

11/24/2

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50-5



Table 1. Yield and Ca Content of Soybeans and Grass

Harvest	Soybeans		Grass	
	Yield	Percent Ca	Approximate Yield	Percent Ca
1	45 gm.	1.78	50	.96
2	202	1.82	60	.59
3	590	1.60	60	.56

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Table 2. Net of 300 m in 10 minutes at 100 m depth. (2000-2001)

Species	Number	Weight (g)
Block A		
Surface, 3 line	1.00	1.00
Surface, 4 line	1.30	1.30
Flowed, 4 line	2.00	2.00
Deep, 4 line raked in	2.00	2.00
Block B		
Deep, 3 line	1.00	1.00
Deep, 4 line	1.30	1.30
Deep, 5 line	1.00	1.00
Deep, 6 line raked in	1.00	1.00
Deep, 7 line	1.00	1.00
Deep, 8 line	1.00	1.00
Deep, 9 line	1.00	1.00
Deep, 10 line	1.00	1.00
Deep, 11 line	1.00	1.00
Deep, 12 line	1.00	1.00
Deep, 13 line	1.00	1.00
Deep, 14 line	1.00	1.00
Deep, 15 line	1.00	1.00
Deep, 16 line	1.00	1.00
Deep, 17 line	1.00	1.00
Deep, 18 line	1.00	1.00
Deep, 19 line	1.00	1.00
Deep, 20 line	1.00	1.00
Deep, 21 line	1.00	1.00
Deep, 22 line	1.00	1.00
Deep, 23 line	1.00	1.00
Deep, 24 line	1.00	1.00
Deep, 25 line	1.00	1.00
Deep, 26 line	1.00	1.00
Deep, 27 line	1.00	1.00
Deep, 28 line	1.00	1.00
Deep, 29 line	1.00	1.00
Deep, 30 line	1.00	1.00

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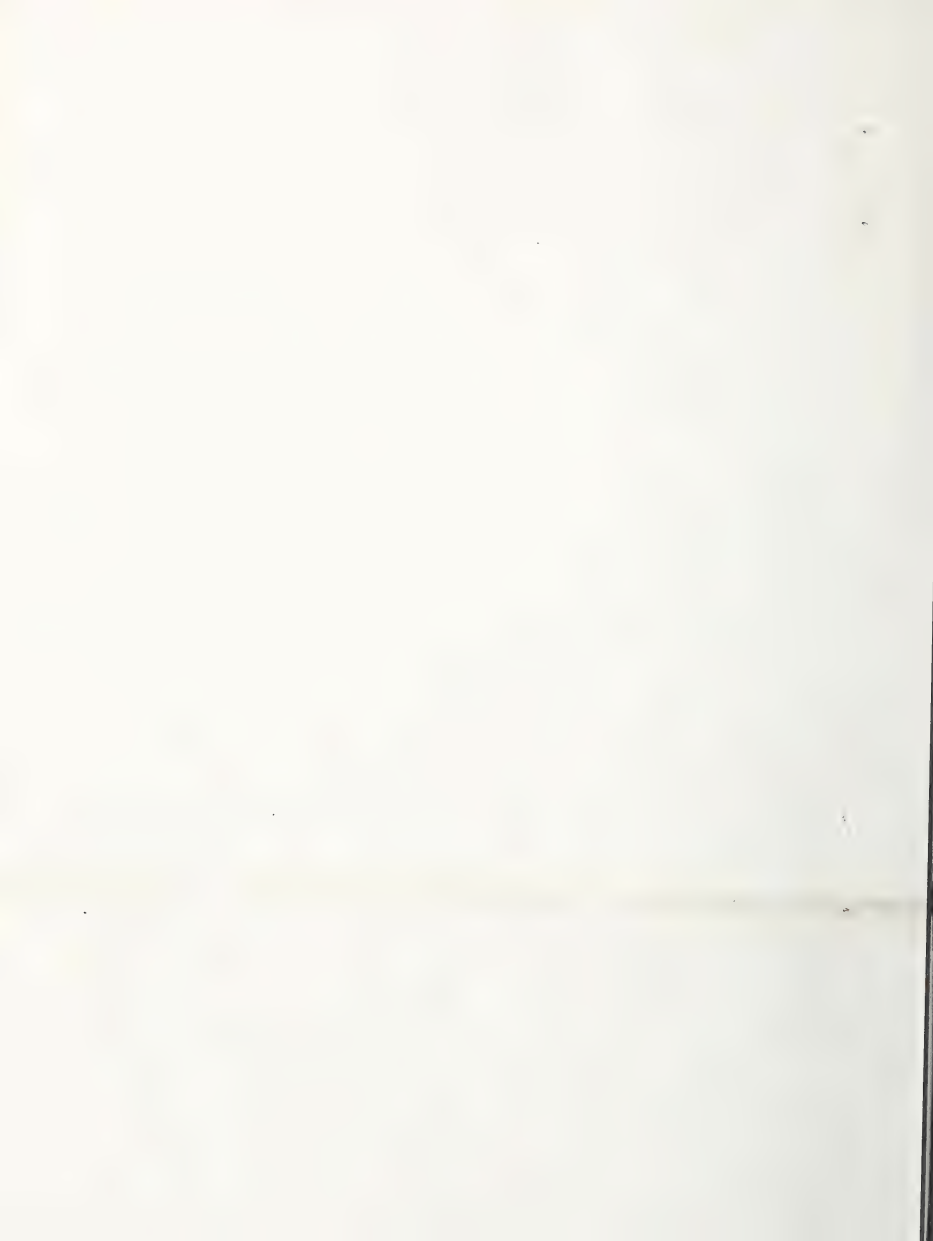


Table 3. Percent of Applied Sr89 Taken Up By Soybeans with Different Tillage Treatments and Additions of Lime

Placement of Sr89	Rate of Lime Application Tons/Acre	Sr89 Taken Up By Soybeans Percent of Application
Block A		
Surface	0	0.67
Surface	4	0.59
Plowed 6 in. deep	4	0.76
Buried 15 in. deep	4 (raked in surface)	0.99
Block B		
Rototilled 6 in. deep	0	1.54
Rototilled " "	4	0.62
Rototilled " "	8	0.70
Buried 15 in. deep	4 (buried 15 in. deep)	0.52
L.S.D. (.05)		0.46
L.S.D. (.05) in different blocks		0.91

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